

CHAPTER 15

CHARACTERISTICS OF WAVES

SECTION 15-1 What Are Waves? (pages 472-475)

This section explains what causes waves and identifies the three main types of waves.

► Waves and Energy (pages 472-473)

1. What is a wave? a wave disturbance that transfers energy from place to place
2. The material through which a wave travels is called a(n) medium
3. Circle the letter of each of the following that can act as mediums.
☒ a. solids ☒ b. liquids ☒ c. gases ☐ d. empty space
4. Waves that require a medium through which to travel are called mechanical wave
5. Is the following sentence true or false? When waves travel through a medium, they carry the medium with them. false ^{what do waves carry?}
6. Explain what happens to a duck on the surface of a pond when a wave passes under it. the duck moves up & down, but does not move along the surface of the water
7. Give an example of a wave that can travel through empty space. light
8. Waves are created when a source of energy causes a medium to vibrate

CHAPTER 15, Characteristics of Waves (continued)

9. What is a vibration? a repeated back + forth
or up & down

► Types of Waves (pages 474–475)

10. How are waves classified? according to how
they move

11. Waves that move the medium at right angles to the direction in which the waves are traveling are called transverse waves

12. Suppose you move the free end of a rope up and down to create a wave. In that case, the rope is the medium. What is the relationship between the movement of the wave and the movement of the particles of the medium?
as the transverse wave moves in
one direction, the particles of the medium move
across the direction of the wave

13. The highest parts of a transverse wave are called crest.

14. The lowest parts of a transverse wave are called trough.

15. What type of waves move the particles of the medium parallel to the direction in which the waves are traveling? longitudinal wave

16. In longitudinal waves in a spring, the parts where the coils are close together are called compressions

17. In longitudinal waves in a spring, the parts where the coils are spread out are called rarefactions

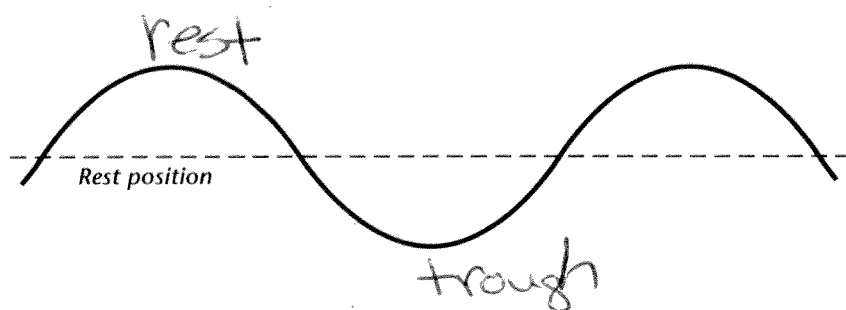
18. Waves that are combinations of transverse and longitudinal waves are called surface waves

19. Where do surface waves occur? at the surface
b/w two mediums

CHAPTER 15, Characteristics of Waves (continued)**► Wave Diagrams** (pages 476–477)

2. On the transverse wave in Figure 5 on page 477, what does the line called the rest position represent? it represents the position of the rope before it is disturbed


3. On the wave diagram below, label a crest and a trough.



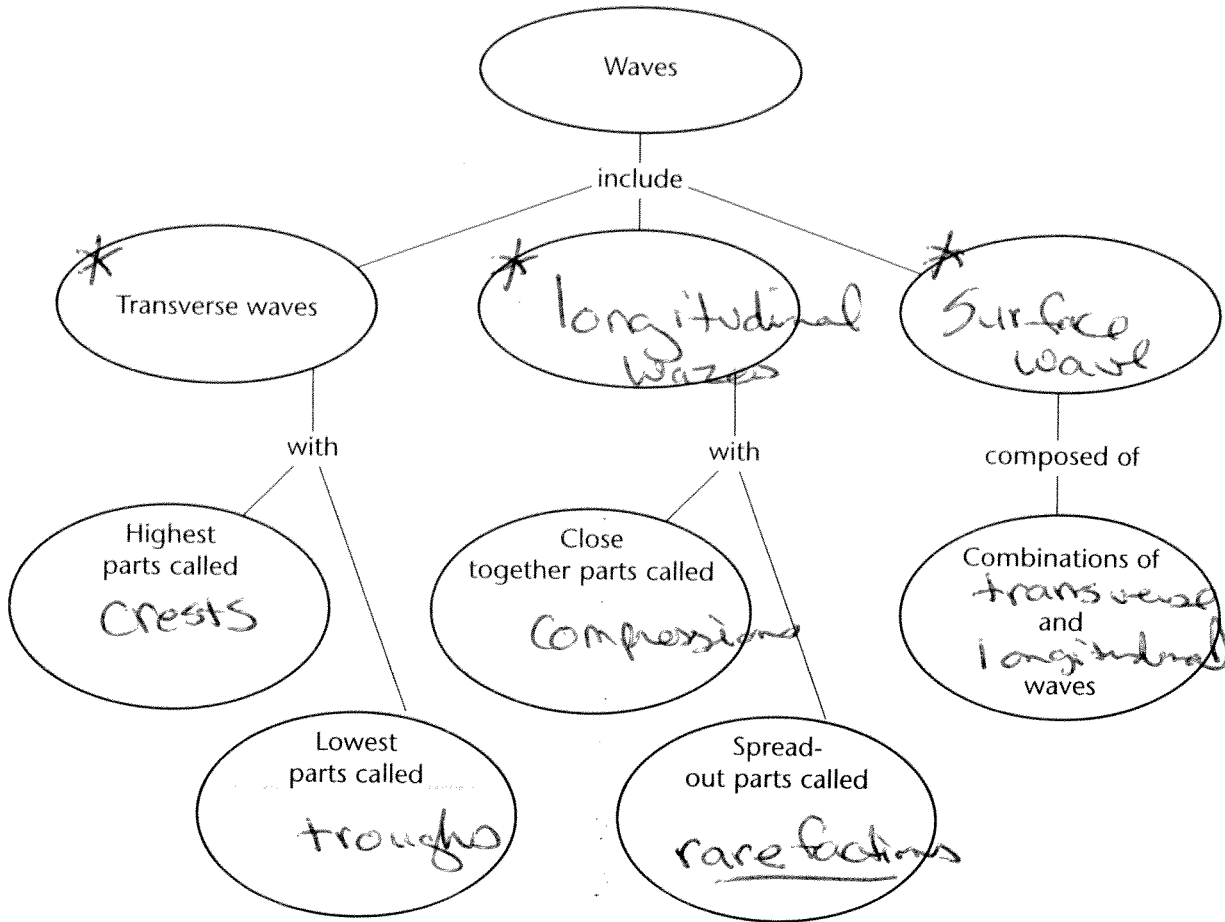
4. If you were to draw a longitudinal wave, you should think of the compressions as crest on a transverse wave and the rarefactions as trough on a transverse wave.

► Amplitude (pages 477–478)

5. The maximum distance the particles of the medium carrying a wave move away from their rest position is called the wave's amplitude
6. Explain what the amplitude of a water wave is. the maximum distance a water particle moves above or below the surface level of calm water
7. The amplitude of a wave is a direct measure of the wave's energy.
8. What is the amplitude of a longitudinal wave? It's a measure of how compressed or rarefied the medium becomes

20. In surface waves, the combination of transverse and longitudinal motions produces Circular motion 

21. Complete this concept map about types of waves.



SECTION 15-2 Properties of Waves

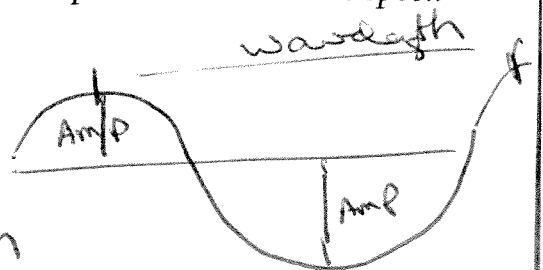
(pages 476-481)

This section describes the basic properties of waves. It also explains how a wave's speed is related to its wavelength and frequency.

► Introduction (page 476)

1. What are the basic properties of waves?

- a. Amplitude b. wavelength
c. frequency d. speed



9. Circle the letter of each phrase that correctly defines the amplitude of a transverse wave.

- a. The distance from the bottom of a trough to the top of a crest
- ☒ b. The maximum distance the particles of the medium move up or down from their rest position
- c. The maximum distance from one point on the rest position to another point on the rest position
- ☒ d. The distance from the rest position to a crest or to a trough

10. Suppose a longitudinal wave has crowded compressions and loose rarefactions. Does it have a large or a small amplitude?

large

► Wavelength (page 479)

11. The distance between two corresponding parts of a wave is its

wavelength

12. How can you find the wavelength of a longitudinal wave? you

can measure the distance from one compression to the next

► Frequency (page 480)

13. The number of complete waves that pass a given point in a certain amount of time is called the wave's frequency

14. If you make a wave in a rope so that one wave passes every second, what is its frequency? 1 wave per second

15. Circle the letter of the unit used to measure frequency.

- a. watt
- b. seconds
- c. joule
- ☒ d. hertz

► Speed (pages 480–481)

16. The speed of a wave is how far the wave travels in one unit of

time

CHAPTER 15, Characteristics of Waves (continued)

Complete the following formulas.

17. Speed = $\frac{\text{wavelength} \times \text{Frequency}}{\lambda}$

18. Frequency = $\frac{\text{speed}}{\text{wavelength} \lambda}$

19. Wavelength = $\frac{\text{Speed}}{\text{freq}}$

20. Circle the letter of each sentence that is true about the speed of waves.

a. All sound waves travel at the same speed.

☒ b. In a given medium and under the same conditions, the speed of a wave is constant.

☐ c. If the temperature and pressure of air change, the speed of sound waves traveling through the air will change.

☒ d. Waves in different mediums travel at different speeds.

21. If you increase the frequency of a wave, the wavelength must

decrease

SECTION Interactions of Waves

15-3 (pages 482-487)

This section describes how waves bend and how waves interact with each other.

► Reflection (page 482)

- On the illustration below, write labels and draw arrows to show the location of the angle of incidence and the angle of reflection.

